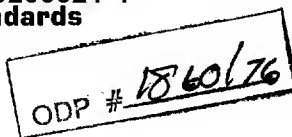


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UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234



1976 September 13

*Copy to ADP Central
Bureau on 9/29.*

MEMORANDUM FOR FIPS Points of Contact
FIPSCAC

From: Harry S. White, Jr. *Harry S. White Jr.*
Associate Director
Office of ADP Standards Management

Subject: Approved Federal Standard COBOL Interpretation No. 1,
The COMPUTE Statement

Enclosed is the approved interpretation of the COMPUTE statement in Federal Standard COBOL. This approved interpretation, on the effective date, becomes an integral part of Federal Standard COBOL and, as such, is considered to be included whenever a reference is made to Federal Standard COBOL. The effective date will be 30 days from the date the approved interpretation is published in the Federal Register.

Enclosure
As Stated

cc: State Information Systems Coordinators

FEDERAL STANDARD COBOL
INTERPRETATION

SUBJECT: The COMPUTE Statement

INTERPRETATION NO: 1

EXPLANATION: Under the provisions of Public Law 89-306 and Executive Order 11717, the Secretary of Commerce is authorized to establish uniform Federal ADP Standards. FIPS PUB 21-1 specifies Federal Standard COBOL. The Standard defines the elements of the COBOL Programming Language and the rules for their use. During the use of the standard, questions arise as to the meaning of certain language specifications. FIPS PUB 29 defines the procedures to be followed in providing solutions to these questions. The procedures allow for the solutions to be used uniformly throughout the Federal Government and by all implementors of compilers acquired by the Federal Government. Accordingly, in the January 15, 1976 issue of the Federal Register (FR Doc 76-1184, page 2270), the National Bureau of Standards published a notice of proposed interpretation of Federal Standard COBOL as pertains to the evaluation of arithmetic expressions in the COMPUTE statements. All comments submitted about the proposed interpretation have been duly considered.

The following approved interpretation contains a definition of the problem, discussion of the issues, approved language interpretation, necessary clarifications to Federal Standard COBOL, and the effective date of the interpretation. The approved interpretation, as of the effective date, becomes an integral part of Federal Standard COBOL and, as such, is considered to be included whenever reference is made to Federal Standard COBOL.

PROBLEM: There is no standard interpretation of the accuracy of the arithmetic operations and the timing and scope of the ROUNDED phrase among implementations of the COMPUTE statement. Both of these problems involve intermediate results. This situation not only adversely impacts the portability of COBOL programs, but also creates a major problem in the development of test programs in this area.

ISSUES: The variations in the implementation of the COMPUTE statement are due in part to the lack of specifications which address the following issues in the Federal COBOL Standard:

- a. The number of decimal digits to be provided for intermediate result fields.
- b. The behavior of the decimal point, if specified, in an intermediate result field.
- c. The scope of applicability of the ROUNDED phrase in the COMPUTE statement.
- d. Whether rounding or truncation will be applied to an intermediate result field.

INTERPRETATION: This interpretation applies to both American National Standard COBOL X3.23-1968 and X3.23-1974 as they have been adopted as Federal Standard COBOL, FIPS PUBS 21 and 21-1, respectively. The interpretation is in four parts. Each part addresses one of the four issues related above.

- a. The size of the intermediate result field is implementor-defined.
- b. Decimal point alignment is required throughout the evaluation of the arithmetic expression.
- c. The ROUNDED phrase in the COMPUTE statement applies only to the assignment of the intermediate result field to the identifier to the left of the equal sign. If the ROUNDED phrase is not specified, truncation, if required, will apply to the assignment of the intermediate result field to the identifier to the left of the equal sign.
- d. The implementor will define whether truncation or rounding will occur on the intermediate result when it exceeds the size of the intermediate results field.

DISCUSSION: The following discusses the rationale supporting each of the four points in the interpretation.

- a. ANS X3.23-1968 (page 2-71, paragraph 5.1.3(5)) and ANS X3.23-1974 (page II-40, paragraph 5.1.3(5)) specify that "each implementor will indicate the technique used in handling arithmetic expressions". This specification is interpreted to mean the techniques defined by the implementor include determination of the size of the intermediate result field.

b. ANS X3.23-1968 (page 2-78, paragraph 5.4.4(1)) and ANS X3.23-1974 (page II-51, paragraph 5.3.4(1)) specify that "...decimal point alignment is supplied throughout the calculation". Decimal point alignment is therefore required throughout the development of the final result in the intermediate result field dependent only on the operands involved in an arithmetic expression.

c. ANS X3.23-1968 (page 2-76, paragraph 5.4.1) and ANS X3.23-1974 (page II-50, paragraph 5.3.1) specify that when rounding is requested (the presence of the ROUNDED phrase), the absolute value of the resultant-identifier is increased. Truncation will take place, as necessary, when the ROUNDED phrase is not specified. The standard does not specify or imply that the presence or absence of the ROUNDED phrase in the COMPUTE statement has any effect on the intermediate result field prior to the assignment of that field to the resultant-identifier.

d. The techniques defined by the implementor to be used in the handling of arithmetic expressions is interpreted to include the application of rounding or truncation to the intermediate result field.

CLARIFICATIONS TO THE FEDERAL COBOL STANDARD: None.

EFFECTIVE DATE OF THE INTERPRETATION: This interpretation is effective 30 days after publication in the Federal Register.

Approved: _____

E. A. Aubert
Acting Director, NBS

SEP 3 1976

Date

Disapproved: _____

Acting Director, NBS

Date